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Claims

[c1] 1. A structure comprising a system for controlling at least one of the position, alignment, and attitude of the structure in a zero or low-gravity environment, the system comprising means for emitting energy beams and targets impacted by the energy beams to cause ablation of the targets, the emitting means and the targets are adapted to cooperate and cause the structure to undergo motion of at least one of translation and rotation in reaction to motion of material ablated from the targets.

[c2] 2. The structure according to claim 1, wherein the emitting means comprises a laser gun and the energy beam thereof is a laser beam.

[c3] 3. The structure according to claim 1, wherein the emitting means comprises an electron gun and the energy beam thereof is an electron beam.

[c4] 4. The structure according to claim 1, wherein the targets are shaped such that some of the material ablated from each of the targets travels toward and some of the material ablated from each of the targets travels away from the emitting means from which the impacting en-

ergy beam is emitted, the structure further comprising means for controlling the amount of the material that collects on the emitting means as a result of being deflected by the targets to travel toward the emitting means.

[c5] 5. The structure according to claim 1, further comprising support means extending in opposite directions from the structure along at least one axis of the structure, at least one of the emitting means and the targets being mounted to the support means.

[c6] 6. The structure according to claim 5, wherein the emitting means comprises two energy beam sources mounted to the structure, the targets comprise first and second targets mounted to opposite ends of the support means, and the two energy beam sources and the first and second targets are adapted to cooperate and cause the structure to undergo rotation in reaction to the motion of the material ablated from the first and second targets.

[c7] 7. The structure according to claim 1, further comprising support means extending from the structure along at least one axis of the structure, at least one of the emitting means and the targets being mounted to the support means.

[c8] 8. The structure according to claim 7, wherein the emitting means comprises two energy beam sources mounted to the structure, the targets comprise a first target mounted to the support means, and the two energy beam sources and the first target are adapted to cooperate and cause the structure to undergo translation in reaction to the motion of the material ablated from the first target.

[c9] 9. The structure according to claim 1, further comprising support means extending in opposite directions from the structure along at least two axes of the structure, at least one of the emitting means and the targets being mounted to the support means.

[c10] 10. The structure according to claim 9, wherein the emitting means comprises energy beam sources mounted to the structure, the targets are mounted to opposite ends of the support means, and the energy beam sources and the targets are adapted to cooperate and cause the structure to selectively undergo translation and rotation in reaction to the motion of the material ablated from the targets.

[c11] 11. The structure according to claim 1, further comprising support means extending in opposite directions from

the structure along three axes of the structure, at least one of the emitting means and the targets being mounted to the support means.

[c12] 12. The structure according to claim 11, wherein the emitting means comprises energy beam sources mounted to the structure, the targets comprise targets mounted to opposite ends of the support means, and the energy beam sources and the targets are adapted to co-operate and cause the structure to selectively undergo translation along each of the axes and rotation about each of the axes in reaction to the motion of the material ablated from the targets.

[c13] 13. The structure according to claim 11, wherein the emitting means comprises energy beam sources mounted to opposite ends of the support means, the targets comprise targets mounted to the structure, and the energy beam sources and the targets are adapted to cooperate and cause the structure to selectively undergo translation along each of the axes and rotation about each of the axes in reaction to the motion of the material ablated from the targets.

[c14] 14. The structure according to claim 11, wherein the emitting means comprises energy beam sources mounted to opposite ends of the support means, the

targets comprise targets mounted to the support means adjacent the energy beam sources, and the energy beam sources and the targets are adapted to cooperate and cause the structure to selectively undergo translation along each of the axes and rotation about each of the axes in reaction to the motion of the material ablated from the targets.

[c15] 15. The structure according to claim 1, further comprising means for controlling aiming and firing of the emitting means.

[c16] 16. The structure according to claim 15, further comprising means in communication with the controlling means for sensing at least one of the position, alignment, and attitude of the structure.

[c17] 17. The structure according to claim 15, further comprising means in communication with the controlling means for sensing the firing of the emitting means.

[c18] 18. The structure according to claim 17, further comprising feedback means that senses at least one of the position, alignment, and attitude of the structure, performs an adaptive learning algorithm to produce modified position, alignment, or attitude data, and communicates the modified position, alignment, or attitude data

to the controlling means.

[c19] 19. The structure according to claim 1, wherein the structure is a satellite and the motion is a station-keeping maneuver.

[c20] 20. The structure according to claim 1, wherein the structure is a spacecraft and the motion is an attitude control maneuver.

[c21] 21. A method for controlling at least one of the position, alignment, and attitude of a structure in a zero or low-gravity environment, the method comprising the steps of emitting energy beams at targets so that the energy beams impact the targets and cause ablation of the targets, and the structure undergoes motion of at least one of translation and rotation in reaction to motion of material ablated from the targets.

[c22] 22. The method according to claim 21, further comprising controlling the amount of the material that collects on the emitting means as a result of being deflected by the targets to travel toward the emitting means.

[c23] 23. The method according to claim 21, wherein at least two of the energy beams are emitted in directions away from the structure, the targets are spaced apart from the structure, and the structure undergoes rotation in reac-

tion to the motion of the material ablated from the targets by the at least two energy beams.

[c24] 24. The method according to claim 21, wherein at least two of the energy beams are emitted in directions away from the structure toward a first of the targets spaced apart from the structure, and the structure undergoes translation in reaction to the motion of the material ablated from the first target by the at least two energy beams.

[c25] 25. The method according to claim 21, wherein the energy beams are emitted in directions away from the structure, the targets are spaced apart from the structure, and the structure undergoes translation and rotation in reaction to the motion of the material ablated from the targets.

[c26] 26. The method according to claim 21, wherein the energy beams are emitted in directions away from the structure, the targets are spaced apart from the structure, and the structure undergoes translation along each of three axes and rotation about each of the three axes in reaction to the motion of the material ablated from the targets.

[c27] 27. The method according to claim 21, wherein the en-

ergy beams are emitted in directions toward from the structure and the targets, and the structure undergoes translation along each of three axes and rotation about each of the three axes in reaction to the motion of the material ablated from the targets.

[c28] 28. The method according to claim 21, further comprising controlling aiming and firing of the energy beams.

[c29] 29. The method according to claim 21, further comprising controlling aiming and firing of the energy beams in response to sensing of at least one of the position, alignment, and attitude of the structure.

[c30] 30. The method according to claim 21, further comprising controlling aiming and firing of the energy beams in response to sensing of the motion of the structure.

[c31] 31. The method according to claim 30, further comprising sensing at least one of the position, alignment, and attitude of the structure, performing an adaptive learning algorithm to produce modified position, alignment, or attitude data, and modifying the aiming and firing of the energy beams in response to the modified position, alignment or attitude data.

[c32] 32. The method according to claim 21, wherein the structure is a satellite and the motion is a station-keep-

ing maneuver.

[c33] 33. The method according to claim 21, wherein the structure is a spacecraft and the motion is an attitude control maneuver.